U. S. DOE-PRC CAS Agreement on "Climate Sciences"

Spring 1984 at Washington DC, starting the scientific exchanges

August 19, 1987 at Beijing, signing the official agreement



August 26-29, 1987, West Virginia



SECOND SCIENCE TEAM MEETING BETWEEN THE PEOPLES REPUBLIC OF CHINA, ACADEMIA SINICA AND THE UNITED STATES OF AMERICA, DEPARTMENT OF ENERGY ON THE COLLABORATIVE RESEARCH ON CARBON DIOXIDE-INDUCED CLIMATE CHANGE HARPER'S FERRY, WEST VIRGINIA, U.S.A. AUGUST 26-29, 1987

Evolution of the Joint Agreement

- □ DOE-CAS signed the "Study of the Greenhouse Effect" on 19 August, 1987, after three years of scientist-to-scientist exchanges;
- □ DOE-CMA signed the "Regional Climate Study" on 23 February, 1995;
- □ DOE-MOST signed "Climate Sciences" on 20 April, 2000

Participating Agencies

- United States of America
 - Department of Energy, Office of Biological and Environmental Research,
- □ People's Republic of China
 - > Chinese Academy of Sciences;
 - > China Meteorological Administration

Key Contacts

☐People's Republic of China

- Chinese Academy of Sciences: Yiyu Chen, Vice President; Panqin Chen, Deputy Director General, Bureau of Science and Technology for Resources and Environment
- China Meteorological Administration: Dahe Qin, Administrator; Shuguang Zhou and Yihui Ding

☐ United States of America

- Department of Energy: Michael R. Riches, Office of Biological and Environmental Sciences:
- ➤ State University of New York at Albany: Wei-Chyung Wang

Participating Institutions

☐People's Republic of China

- Chinese Academy of Sciences: Institute of Atmospheric Physics and Institute of Geographical Sciences and Natural Resource Research
- China Meteorological Administration: National Climate Center and National Meteorological Center

☐ United States of America

- ➤ Universities: State University of New York at Albany; State University of New York at Stony Brook; Portland State University; Oregon Graduate Center
- DOE National Laboratories: Lawrence Livermore National Laboratory; Pacific Northwest National Laboratory; Oak Ridge National Laboratory
- ➤ National Climatic Data Center
- ➤ National Center for Atmospheric Research

Major Events

- □ First Science Team Meeting, June 12-15, 2001, Washington DC, USA
- □ DOE-MOST management meeting, September 1-4, 2001, Beijing, China
- □ Second Science Team Meeting, October 27-30, 2003, Beijing, China
- □ Participation in the Clean Coal Conference, November 17-19, 2003, Washington DC, USA

DOE & CAS-CMA Agreement: Major Accomplishments

- □ The reconstruction of 2,000 years climate records over China to study decadal & centennial climate variability and to compare with GCM simulations;
- □ Long-term measurements of methane emissions from rice paddies to understand the global methane budget;
- □ A high resolution instrumental data set for China that can be used to develop and validate regional climate models.

U. S. Department of Energy andP. R. C. Chinese Academy of Sciences &China Meteorological AdministrationJoint Agreement, "Climate Science"

Objectives

- ☐ To improve global and regional general circulation climate models
- ☐ To understand and project regional climate changes and the associated effect and impact caused by increasing greenhouse gases and aerosols due to anthropogenic activities

Technical Tasks

- ☐ Task A: Analysis of general circulation models
- ☐ Task B: Climate data preparation and analysis
- □ Task C: Measurements of atmospheric trace constituents
- ☐ Task D: Effect and impact of climate change on human and natural systems

Task A: Analysis of general circulation models

- ☐ To analyze GCM simulations of past and present global and regional climates for further improvement
- ☐ To improve global and regional models for simulating regional climate
- ☐ To use the improved models for projecting global and regional climate changes.

Task B: Climate data preparation and analysis

- ☐ To prepare quality controlled instrumental data for the U.S.A. and P.R.C.
- ☐ To prepare proxy climate records derived from historical documents and tree rings in China
- ☐ To extract climate information (temperature, carbon dioxide and methane concentrations from ice core data in China.
- ☐ To use the datasets for conducting climate model-toobservation comparisons and to examine climate variability, and its association with extreme events.

Task C: Measurements of atmospheric trace constituents

☐ To study the sources of greenhouse gases and emissions in the atmosphere, including carbon dioxide, methane and nitrous oxide ☐ To produce more accurate estimates of emissions of these gases from China and their contributions to global budgets with focus on the emissions from agricultural systems and the effects of agriculture on the carbon cycle

Task D: Effect and impact of climate change on human and natural systems

- □ To examine the regional scale effects of climate change and climate variability on natural resources (water and unmanaged ecosystems) and on agriculture, grazing and forestry.
- □ To apply process models (for crop yields, soil erosion, runoff, stream flow and changes in bio-geography) to selected regions of China and the U. S. using validated data sets on climate, soils and management practices.
- □To use historical, instrumental and remote sensing data to validate the process models and as inputs to global and regional climate models, which will be used to drive the process models mentioned above.

IN SUMMARY

□Significant scientific progress has been achieved and we have provided fundamental capabilities to advance our science, including training the next generation of scientists.

KEY QUESTIONS REMAIN

- **□**How good are the models?
- **□**Can we attribute cause and effect?
- ☐ How much and how fast will climate change globally and regionally? Including the variability and extremes.
- ☐ How will natural and human systems respond to the changes?